REMARKS

Reconsideration and allowance of the present application is respectfully requested.

The specification has been amended as shown above to correct the spelling of "solution" as requested by the Examiner.

Claims 1-4 has been amended as shown above to more clearly recite patentable features of the present invention.

Claims 1-5 remain in this application. Claims 1-4 have been amended. Claim 5 is withdrawn.

Claims 1-4 have been rejected under 35 USC 112, second paragraph because the Examiner finds claims 1-4 to be indefinite for the reasons expressed at page 4 of the Office Action.

The present claims have been amended, as shown above, to recite a process for determining a minimum amount of a ultraviolet absorptive compound for the production of a weather resistant coating film, which can keep a gloss retention of 80% or more for 2,500 hours or more in an accelerated weathering test by a carbon sunshine weather-o-meter.

Thus, contrary to the Office Action, the presently claimed invention is not merely the application of the theory wherein to improve the weather resistance, the amount of UV absorptive compound to be used should be relatively increased.

Please note that further amended features in claim 1 include:

1) The period for which the weather resistant coating film can keep a gloss retention of 80% or more in an accelerated weathering test by a carbon sunshine weather-o-meter is extended to "2500 hours or more". This is supported in the present specification, including in the last paragraph on page 30 of the specification.

Further, in the Examples the coating film of the presently claimed invention are shown to keep a gloss retention of 80% or more for 2500 hours or more (See Table 4).

2) The conditions employed in the accelerated weathering test by the carbon sunshine weather-o-meter, i.e. the black panel temperature and the spray cycle, are specified. These conditions are standard conditions in the test of the weather resistance. As evidence of this, the applicants attach hereto, as a technical reference, an English translation of JIS (Japanese Industrial Standard) K 7350-4, entitled "Plastics - Methods of exposure to laboratory light sources Part 4: Open-flame carbon-arc lamp". As recited in the translation, this standard as such corresponds to ISO 4892-4 and thus is an international standard.

Thus, the presently claimed invention (as amended) is directed to a process for determining a minimum amount of a ultraviolet absorptive compound to be chemically bonded to a binder and/or a curing agent for the production of a weather resistant coating film which can keep a gloss retention of 80% or more for 2,500 hours or more in an accelerated weathering test by a carbon sunshine weather-o-meter.

Although the use of a UV absorptive compound to improve the weather resistance was known, none of the prior art describe or suggest at least how much UV absorptive compound is necessary to achieve high weather resistance (gloss retention) for a desired period of time. For this reason, one had to determine a proper amount of the UV absorptive compound by trial-and-error or use an excessive amount of UV absorptive compound. Since UV absorptive compounds are generally expensive, it was not economical.

With respect to the presently claimed invention, the applicants found that the weathering resistance does not depend on the composition of the binder but on the absorption property (molecular extinction coefficient) and amount of the UV absorptive compound. Accordingly, the present process was developed for determining a minimum amount of the UV absorptive compound to be used to obtain a film with weather resistance (gloss retention) for a desired period of time.

The amended claims are clear, definite and fully supported, being directed to the method for determining a minimum amount of a ultraviolet absorptive compound to be chemically bonded to a binder and/or a curing agent for the production of a coating film comprising the binder and the curing agent which can keep a gloss retention of 80% or more for 2500 hours or more in an accelerated weathering test by a carbon sunshine weather-o-meter.

In contrast, the claims as considered in the prior Office Action are directed to the process for "producing a weather resistant coating film". The process for producing a weather resistant coating film as previously considered, however, included the process of determining a minimum amount of a ultraviolet absorptive compound.

Indeed, the applicants asserted that the advantage of the process for producing a weather resistant coating film as previously considered, over the prior art, is that the necessary and sufficient amount (i.e. the minimum amount) of UV absorptive compound can be determined, based on the mathematical formula recited in claim 1 (see the last paragraph on page 10 in the Remarks section of the Amendment filed on September 25, 2003).

Further, the Examiner also acknowledges that the above assertion "appears to be true" (see lines 15-18 (particularly line 18) on page 10 of the present Office Action) and further states:

> "However, this 'determination' step is not currently present in the claims of the instant application. In other words, the claims do not require (1) first choosing a desired exposure time, dry film thickness, and UV-absorptive compound having a given extinction coefficient, (2) plugging the values of the aforementioned variables into the formula of Claim 1 to determine the appropriate concentration of the UV-absorptive compound, and then (3) preparing a coating material having the aforementioned concentration determined by the formula." (page 10, line 18 to page 11, line 3 of Office Action)

The process for determining the minimum amount of a UV absorptive compound as now claimed, indeed, corresponds to this "determination step" which is included in the production process as originally filed. The amendment of the "method for producing a weather resistant coating film" to the "process for determining a minimum amount of the UV absorptive compound", therefore, does not add any new matter. For the same reason, the presently amended claims will not necessitate an additional search.

The applicants note that the phrase "in an accelerated weathering test by a carbon sunshine weather-o-meter" recited in claim 1 as originally filed was objected to as being indefinite in the Office Action mailed on June 27, 2003 (See page 5, item 12 in the Office Action), since the exposure conditions for performing the accelerated weathering test are not disclosed in the specification. This phrase, once deleted, is now re-introduced into claim 1 by amendment. Upon re-introducing the above phrase, the applicants also introduce the exposure conditions in the accelerated

weathering test by a carbon sunshine weather-o-meter, i.e. black panel temperature of 63 °C and a spray cycle of 12 min./60 min to dissolve the indefiniteness.

The recited exposure conditions are standard conditions in the test of weather resistance of plastics, etc. As evidence of support, the applicants attach herewith, as earlier noted, an English translation of JIS (Japanese Industrial Standard) "K 7350-4" entitled "Plastics - Methods of exposure to laboratory light sources Part 4: Open-flame carbon-arc lamp". The "Open-flame carbon-arc lamp" is the same as the carbon sunshine arc lamp, as recited in line 13 on page 3 of JIS K 7350-4. JIS K 7350-4 defines the standard conditions to be employed in the weathering test with a carbon sunshine weather-o-meter. Indeed, as recited in "Preliminary Notice as JIS" on page 2 of the translation of JIS K 7350-4, this standard, as it is, corresponds to ISO 4892-4. These standard conditions are thus internationally employed.

Under item 6.1 on page 8 of the translation of the standard, the black panel temperature is defined as 63 °C, unless otherwise specified. Under item 6.3 on the same page, it is stated that the water spray cycle is desirably 18 min./120 min. or 12 min./60 min.

The applicants further submits herewith, an English translation of an abstract from Choichi, SUGA, "Weather and Light Resistance and Color" (published by Suga Test Instruments, Co., Ltd., 1988) that clearly states that a water spray cycle of 12 min./60 min. is generally employed in Japan, while a water spray cycle of 18 min./120 min. is generally employed in U.S.

The applicants further note that JIS D0205, entitled "Test Method of Weatherability for Automotive Parts" also employs a black panel temperature of 63 °C and a water spray cycle of 12 min./60 min. in the accelerated weathering test by a carbon sunshine weather-o-meter.

Considering the standards described above, established prior to the priority date of the present application, a person of ordinary skill in the art can reasonably understand that a black panel temperature of 63 °C and a water spray cycle of 12 min./60 min. are employed in the accelerated weathering test by a carbon sunshine weather-o-meter in the presently claimed invention.

The present introduction of the conditions in amended claim 1, therefore, does not add new matter.

By introducing the conditions employed in the accelerated weathering test by a carbon sunshine weather-o-meter, which are the same as those defined in widely accepted standards, the process is acceptably definite under 35 USC 112, second paragraph. The applicants submit that all presently considered claims are fully allowable under Section 112. Withdrawal of this rejection is respectfully requested.

The applicants respectfully traverse the rejection of claims 1-4 under 35 USC 102(b) in view of Yanauchi et al. This reference does not anticipate the presently claimed invention or make it obvious.

The applicants note that the claims of the present application, as presently amended, are directed to the process for determining a minimum amount of UV absorptive compound for the production of specific coating film. This renders the rejection to be moot in view of the following remarks.

Yanauchi describes a weather resistant coating film comprising a binder and a curing agent, to either or both of which a UV absorptive compound is chemically bonded. Yanauchi, however, does not provide any consideration of how much UV absorptive compound should be used to obtain a coating film with a gloss retention of 80% or more for a given period of time.

Therefore, although the Examples in Yanauchi teach the coating film which keeps a gloss retention of 80% or more for 2000 hours in an accelerated weathering test by a carbon sunshine weather-o-meter (see paragraph [0051] and Table 5 in Yanauchi), a person of ordinary skill in the art cannot learn or be led to learn by such information, how much UV absorptive compound is necessary to obtain a coating film with a gloss retention of 80% or more for a period of more than 2000 hours in the accelerated weathering test.

In this connection, the Office Action denies the novelty of the present invention by relying upon the thought that one could just use an extremely large amount of the UV absorptive compound in the invention of Yanauchi to lengthen the period for which the gross retention of 80% or more is kept, based on the "theory" that when high gloss retention / weather resistance is desired the concentration of the UV absorptive compound in the film should also be relatively large. This position is, however, based on the premise that the presently claimed invention literally includes the use of an extremely large amount of the UV absorptive compound, i.e. the expression in claim 1 is not of equality but of open-ended equality (see lines 5-17 on page 11 of the Office Action).

Since the claims are now directed, by amendment, to the process for determining the minimum amount of the UV absorptive compound, the above premise is not applicable, and the basis of the rejection is no longer relevant.

Indeed, the applicants maintain that the above position of the Office Action was irrelevant from the first, since it is not feasible to use an extremely large amount of a generally expensive ultraviolet absorptive compound in the industrial production of the coating film.

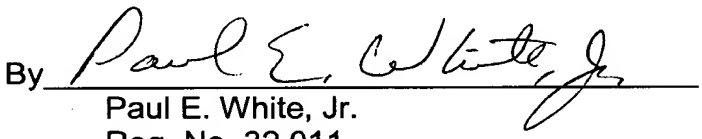
In accordance with the presently claimed invention, however, one can easily determine the proper amount of the UV absorptive compound to be used without trial-and-error. Since Yanauchi does not provide any hint of how much UV absorptive compound is to be used to achieve a desired weather resistance, the method of the presently claimed invention is not only novel, but is further not obvious in view of Yanauchi et al.

In view of the above the applicants submit that the presently claimed invention is fully allowable under both 35 USC 102(b) and additionally, 35 USC 103(a) in view of the cited art.

In view of the above and the attached technical references, it is believed that this application is in condition for allowance and a Notice to that effect is respectfully requested.

Respectfully submitted,

MANELLI DENISON & SELTER, PLLC

By 

Paul E. White, Jr.
Reg. No. 32,011
Tel. No.: (202) 261-1050
Fax No.: (202) 887-0336

2000 M Street, N.W.
Seventh Floor
Washington, D.C. 20036-3307
(202) 261-1000

TECHNICAL REFERENCES

Choichi, SUGA, "Weather and Light Resistance and Color" (published by Suga Test Instruments, Co., Ltd., 1988), Section 4 (Weather (Light) Resistant Test), item 4.4.4 on page 91

4.4.4 Rainfall Control

To apply rainfall onto a sample surface, pressurized water is sprayed with a nozzle for a certain period of time at certain time intervals.

The rainfall time and the rainfall interval are optionally adjusted with an accuracy of at least 0.1 minutes, by a digital adjuster of the time control system, which controls the electromagnetic valve.

The rainfall time and the interval time are generally defined in the standards, which are, 18 minutes of rainfall in an irradiation cycle of 120 minutes in the United States, and 12 minutes of rainfall in an irradiation cycle of 60 minutes in Japan.

JAPANESE INDUSTRIAL STANDARD

Plastics—Methods of exposure to laboratory light sources Part 4 : Open-flame carbon-arc lamps

JIS K 7350-4-1996

(ISO 4892-4 : 1994)

Established 1996-03-01

Investigated by

Japanese Industrial Standards Committee

Published by

Japanese Standards Association

1-24, Akasaka 4-chome, Minato-ku

Tokyo, 107-8440 JAPAN

Printed in Japan

定価:本体 450円(税別)

Japan Industrial Standard JIS

Plastics -Methods of exposure to laboratory light sources- Part 4: Open-flame carbon-arc lamp

K 7350-4:1996

(ISO 4892-4:1994)

Preliminary Notice as JIS

This standard is a Japan Industrial Standard produced by translating ISO 4892-4 (Plastics -Methods of exposure to laboratory light sources- Part 4: Open-flame carbon-arc lamp) without changing the technical content and the form of the standard paper.

The parts underlined with a dotted line in this standard are the matters that are not in the original international standard.

Preliminary Notice of the original international standard (Extract)

ISO 4892 (JIS K 7350) is given a common name of "Plastics - Methods of exposure to laboratory light sources" and consists of the following parts.

Plastics - Methods of exposure to laboratory light sources

Part 1: General guidance

Reference: JIS K 7350-1 (Plastics - Methods of exposure to laboratory light sources Part 1: General guidance)-1995 corresponds to this international standard;

Part 2: Xenon-arc sources

Reference: JIS K 7350-2 (Plastics - Methods of exposure to laboratory light sources Part 2: Xenon-arc sources)-1995 corresponds to this international standard;

Part 3: Fluorescent UV lamps

Reference: JIS K 7350-3 (Plastics - Methods of exposure to laboratory light sources Part 3: Fluorescent UV lamps)-1995 corresponds to this international standard;

Part 4: Open-flame carbon-arc ([1]) lamps

Reference: JIS K 7350-4 (Plastics - Methods of exposure to laboratory light sources Part 4: Open-flame carbon-arc lamps)-1996 corresponds to this international standard;

Note ([1]) also called "sunshine carbon-arc lamps"

Appendix A comprises a part of this standard (Part 4 of ISO 4892). Appendix B and C are attached simply for reference.

1. Scope of Application

This standard (Part 4 of ISO 4892) establishes for a test method by exposing a test piece to an open-flame carbon-arc lamp. The general rules are established in JIS K 7350-1 (ISO 4892-1).

2. Cited standards

The following standards comprise a part of the present standard by citation. At the time of the publication of this standard, the standards of the established year shown herein are effective, any of which may be revised. A user of this standard are desirably examine whether the updated version of the cited standards can be used:

ISO 4582:1980 Plastics - Determination of the change of colour and variation in properties after exposure to daylight under glass, natural weathering, or artificial light.

ISO 4892-1: 1994 Plastics - Methods of exposure to laboratory light sources - Part 1 : General guidance

Reference: JIS K 7350-1 (Plastics - Methods of exposure to laboratory light sources Part 1: General guidance)-1995 corresponds to this international standard

3. Principle

3.1 Test piece of the sample to be tested is exposed to the light source under the controlled environmental conditions.

3.2 The operation includes a method for measuring irradiance and radiant exposure on one side of the test piece.

3.3 It is recommended to expose, as a reference, a similar material whose properties are known, together with the material to be tested.

3.4 Unless the reproducibility between the test apparatuses is established for a material to be tested, it is not recommended to compare the results obtained with the test pieces exposed in the different test apparatuses to each other.

4. Apparatus

4.1 Laboratory light source

4.1.1 The lamp comprises an arc formed between carbon rod electrodes in open air. The specification of the light source is shown in Appendix A.

4.1.2 The radiation reaches a test piece through a filter. The various filters actually used are those having spectral transmission factors.

Table 1 Transmission factors of glass filter at specific wavelengths (before use)

type I		type II		type III	
wave-length nm	trans-mission %	wave-length nm	trans-mission %	wave-length nm	trans-mission %
255	≤1	275	≤2	295	≤1
302	71-86	320	65-80	320	≥40
≥360	>91	400-700	≥90	400-700	≥90

The details of each filter are shown in Appendix B.

The exchange of the carbon rods is in accordance with the manufacturer's instructions.

The filter has to be exchanged at appropriate time intervals (See 7.2.2).

4.2 Chamber (See Appendix B) The chamber is equipped with an test piece attaching frames and an apparatus sending air onto the faces of test pieces.

The test piece attaching frames rotate around the central axis of the carbon-arc attaching folder. A typical diameter of the attaching frame is 96 cm.

Those having a diameter other than 96 cm may be used, according to the agreement between the parties of the delivery.

The attaching frames may hold the test pieces directly as panels or hold them by way of test piece holders attached to the frames. The attaching frame is in vertical or inclined form.

The carbon electrodes at the upper and lower parts and the filter are attached according to the instructions of the manufacturers.

The apparatus has to have a function of program control of a test cycle, within the metes and bounds of the operation.

4.3 Irradiance meter

When an irradiance meter is used, the requirements defined in 5.2 of JIS K 7350-1 (5.2 of ISO 4892-1:1994) have to be followed.

4.4 Black standard temperature gauge/black temperature gauge

The black panel temperature gauge or black standard temperature gauge has to meet the requirements defined in 5.1.5 of JIS K 7350-1 (5.1.5 of ISO 4892-1:1994).

4.5 Apparatus for controlling relative humidity

The relative humidity of the air flowing over the test pieces is optionally controlled to a certain value and is measured by an appropriate measuring apparatus attached in the chamber, clear of irradiation from the lamp.

4.6 Water spraying system

4.6.1 The chamber has to be equipped with a water spraying system having a nozzle for optionally spraying uniformly. Although the system may be made of stainless steel, plastic, or the others, but not of a material that reacts with or contaminates the passing water.

Remark: To meet the requirement of water quality, appropriate filter and deionizing apparatus connected with the water spraying system may be used.

4.6.2 The water spraying system has to provide uniform wetting and rapid cooling. Sprayed water is freely discharged from the wet surface.

4.6.3 The test pieces may be intermittently sprayed with distilled water or deionized water (with an electric conductivity of 5 μS/cm or less). The water has a total solid content of 1 ppm or less and does not leave any remarkable stain or fouling. The required quality of water can be obtained by additionally carrying out ion-exchanging and reverse osmosis treatment, together with the distillation. The pH of the used water has to be recorded.

4.6.4 If condensation time is defined in the program, a water spraying system designed to spray on the rear face or backing of a test piece to cool the test piece.

4.7 Test piece holder

The test piece folder may be in the form of frame which exposes the rear face of a test piece or the one lined to a test piece. The test piece holder has to be made of a metal alloy, such as of aluminum and stainless steel, where oxidation does not occur. Brass, iron, copper, etc. should not be used in the vicinity of a test piece. The backing material to be used is chosen in accordance with the agreement between the parties of the delivery.

4.8 Measuring apparatuses for evaluating changes in properties

The necessary measuring apparatuses as defined in the

international standard (See ISO 4582) is used for the measuring the properties.

5. Test piece

As defined in JIS K7350-1 (ISO 4892-1)

6. Test conditions

6.1 Black panel temperature/black standard temperature

Unless specifically defined, the black panel temperature is 63 ± 3 °C. When a black panel temperature gauge is used, the type of the temperature gauge, a method of attaching to the test piece holder and the temperature employed are to be recorded in a test report.

When water spraying is employed, the temperature at the end of the non-spraying period is employed.

6.2 Relative humidity

Unless specifically defined, the relative humidity is (50 ± 5)%.

Remark: The relative humidity measured in the chamber is not always equal to the moisture content of the air abutting the test piece.

6.3 Water spray cycle

Although the water spray cycle is in accordance with the agreement between the parties of the delivery, it is desirably in conformance with the cycles shown in Table 2.

Table 2 Water spray cycle (unit:min)

Water spray time	Non water spray time
18 ± 0.5	102 ± 0.5
12 ± 0.5	48 ± 0.5

6.4 Cycle comprising dark time

The conditions in 6.1 and 6.3 are applied to the cases where the radiation energy is continuously emitted from the light source. More complex cycle can be programmed by incorporating the dark time which can provide high relative humidity and condensed water formation at high chamber temperature.

These programs are recorded in a test report, together wih the details of the defined conditions.

7. Operation

7.1 Attachment of test piece

Test pieces are attached to the test piece holders in the testing machine, in such a manner that no stress is applied to the test pieces. Each test piece is identified with an appropriate non-vanishing mark, which should not be made on the portion to be used in the following evaluation test. It is advisable to make an arrangement drawing for checking. In the case of a test piece for determining color and appearance change, part of the test piece may be covered with an opaque cover. This is used for reference as an unexposed part in the vicinity of the exposed part. Although this is useful for checking the progress of the exposure, the report data have to be based on the comparison with the sample stored separately in dark place.

7.2 Exposure to the light source

Before attaching the test pieces to the testing apparatus, it is confirmed that the testing machine is operating under the defined conditions (See 6), which should be maintained

through the exposure.

7.2.1 The test pieces are attached above and below the level center line of the light source. In order to uniformly irradiate all the sample pieces, the vertical positions of the test pieces are interchanged in such an order that the equal exposure time is given in each position. In the case where the exposure time is 24 hours or less, each test piece is placed in such a manner that they are at the same distance from the horizontal axis of the arc. In the case where the exposure time is 100 hours or less, the positions of the test pieces should be interchanged everyday. Any other method that can achieve uniform exposure can be used, in accordance with the agreement between the parties of the delivery.

7.2.2 The filter is replaced after 2,000 hours of the use or when a notable discoloration or cloud occur, whichever is earlier. The filter may be cleaned with a clean, dry and non-polishing cloth or towel, or washed with a cleaning fluid before being rinsed with clear water, at intervals of the manufacturer's recommendation. The filters should be replaced on a certain schedule to provide uniform exposure for a long period of time.

In this case, a pair of filters symmetrically located are replaced in order. The used hours and the location of the filter plates are to be recorded, so that the oldest pair of the filters is replaced every time.

7.3 Measurement of radiant exposure

In the case where a measuring apparatus for light intensity, it is to be fixed in such a manner that the irradiance meter

thereof show the irradiance at the exposed surface of the test piece.

The exposure time is indicated by spectral radiant energy (J/m2) per unit area of the exposed surface, with respect to a selected wavelength band.

7.4 Measurement of changes in properties after exposure

The properties are measured according to the regulation of ISO 4582.

8. Test report

Test report is based on the regulations of JIS K 7350-1 (ISO 4892-1).